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Describes study undertaken to investigate the relationship between junior college performance and subsequent performance at Kansas State University, comparable relationships between early and later academic performance for "native" K.S.U. students, and the degree of uniformity among various Kansas junior colleges with respect to junior college grades, K.S.U. grades, and the relationship between the two.							
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Junior College Performance and Its Relationship to Success at Kansas State University

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COLLEGES and universities are becoming increasingly aware of enrollment pressures. As the population increases, and as the popularity of college attendance increases, these pressures will continue to grow.

Educators, in seeking solutions to this problem, have made various proposals. One common proposal has been the suggestion that junior colleges carry increasing responsibilities for the first two years of college, giving present-day four-year colleges and universities primary responsibility for the "screened" upperclassmen and for the graduate program.

In discussing such a proposal, numerous questions regarding junior colleges and their products have been raised. Are their standards sufficiently high? Do they differ among themselves regarding grading practices? Are their programs adequate to permit their students to perform meaningfully in four-year programs? Could junior college performance serve as an adequate screen? The present study was undertaken in an effort to cast some light on such questions.

PURPOSE

More specifically, this study was planned to investigate (a) the relationship between junior college performance and subsequent performance at Kansas State University; (b) comparable relationships between early and later academic performance for "native" KSU students; and (c) the degree of uniformity among various Kansas junior colleges with respect to junior college grades, KSU grades, and the relationship between the two.

SAMPLE

The basic sample (hereafter called the Junior College sample) was composed of all Kansas junior college transfer students who first enrolled at Kansas State in 1954, 1955, or 1956. Eliminations were made if the student failed to complete at least one semester at KSU or

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if he did not take the *American Council on Education Psychological Examination* (ACE), the scholastic aptitude test routinely administered to transfer students. A total of 26 were eliminated for either or both of these reasons. The sample was then composed of 310 men and 80 women.

A comparison sample (hereafter called the KSU sample) was drawn at random from lists of students whose original college registration was at Kansas State. Members of this sample were chosen so that each matched a member of the junior college sample in terms of sex, school, academic standing (freshman, sophomore, etc.), and year of first collegiate enrollment.

PROCEDURE

Three items of information were obtained for each member of the Junior College sample: (1) his junior college grade point average; (2) his cumulative KSU grade point average as of September 1, 1957; and (3) his ACE raw score.

For the KSU sample, "early" and "later" KSU grade point averages were computed. The "early" represented the KSU average for the amount of college work equivalent to that completed in junior college by the matched subject of the Junior College sample. The "later" represented the KSU record *after* that time. "Early" and "later" averages were thus based on entirely separate courses.

For some of the analyses, the samples were subdivided by sex and class, forming six subgroups of the type, "Freshman men." For other analyses, the data were grouped by sex and school, forming five subgroups of the type, "Arts and Science men." (Three of the schools—Agriculture, Engineering, and Home Economics—enrolled only members of one sex for the present sample.)

RESULTS

Relationship of junior college grades and early KSU grades to subsequent performance at Kansas State University. In this part of the study, four questions were investigated:

1. How well do junior college grades forecast KSU grades?
2. How does this compare with findings concerning the relationship of early KSU grades to later grades?
3. Are junior college grades higher or lower than KSU grades?
4. How does this compare with findings concerning early and later KSU grades?

TABLE I
CORRELATION OF EARLY ACADEMIC RECORD WITH SUBSEQUENT
KSU AVERAGE FOR STUDENTS IN VARIOUS KSU SCHOOLS

School	Sample		
	N	Junior College	KSU
Agriculture	46	.782	.838
Arts and Science (men)	91	.334	.593
Engineering	173	.507	.630
Arts and Science (women)	41	.654	.832
Home Economics	39	.641	.860

Answers to questions "1" and "3" were obtained by correlating junior college grade point average with KSU average for the Junior College sample, and by examining mean differences in these two averages. To answer questions "2" and "4" similar statistics were computed for the KSU sample.

Tables I and II present the results obtained with respect to the first two questions.

An examination of Tables I and II with respect to the first two questions suggests the following:

1. Junior college grades were positively related to KSU grades, but the magnitude of the relationship varied with school, class, and sex. Thus they were of little value in forecasting KSU performance for Arts and Science men ($r = .334$), and freshman men ($r = .278$). Intermediate correlations were obtained for Engineering students ($r = .507$) and for junior men ($r = .483$). Relatively high forecasting ability was found for Agriculture students and for all women's groupings.

TABLE II
CORRELATION OF EARLY ACADEMIC RECORD WITH SUBSEQUENT
KSU AVERAGE FOR STUDENTS IN VARIOUS CLASSES

Class*	Sample		
	N	Junior College	KSU
Freshman men	35	.278	.549
Sophomore men	106	.546	.593
Junior men	169	.483	.669
Sophomore women	26	.717	.764
Junior women	44	.774	.913

* Figures for freshman women are not reported because of the small sample size ($N=10$).

TABLE III
EARLY AND LATER GRADE POINT AVERAGES* FOR STUDENTS
IN VARIOUS KSU SCHOOLS

School		Sample	
		Junior College	KSU
Agriculture (N=46)	Early GPA	1.542	1.297
	Later GPA	1.318	1.472
	Difference	.224	-.175
Arts and Science (men) (N=91)	Early GPA	1.552	1.174
	Later GPA	1.280	1.414
	Difference	.272	-.240
Engineering (N=173)	Early GPA	1.696	1.361
	Later GPA	1.204	1.289
	Difference	.492	.072
Arts and Science (women) (N=41)	Early GPA	2.085	1.413
	Later GPA	1.580	1.541
	Difference	.505	-.128
Home Economics (N=39)	Early GPA	2.311	1.582
	Later GPA	1.833	1.735
	Difference	.478	-.153

* GPA were computed on the three-point system: A=3; B=2; C=1; D=0; F=-1.

2. Without exception, early KSU record predicted later KSU record more accurately than did junior college record. In the cases of Agriculture students and sophomore men and women these differences were slight, but they were substantial for the other seven groups.

3. Women's grades were considerably more predictable (i.e., consistent over time) than were men's. (Agriculture men were an exception.) This finding has been reported in other studies, and probably reflects more stability in academic motivation on the part of women than is true for men.

4. Predictions of future grades were more accurate as students advanced from freshman to junior status. This finding is not surprising; it simply confirms the supposition that predictions of the future improve as more and more of the past is used to make those predictions.

The two questions relating to the absolute level of junior college and KSU grades are answered in Tables III and IV.

Data in these tables established a consistent trend: for the Junior College sample, early (junior college) grades averaged higher than

did later (KSU) grades. In terms of schools, the differences were about one-half of a grade point for Arts and Science women, Home Economics, and Engineering students, and about one-fourth of a grade point for Arts and Science men and Agriculture students. There was a bigger discrepancy for upperclassmen than for freshmen.

When the KSU sample was considered, however, there was a trend for the later grade point average to be slightly *higher* than the early average. Minor exceptions occurred in the case of Engineering students and sophomore men. A detailed examination of the data showed that these exceptions were due entirely to the trend found for the Engineering sophomores of the KSU sample, whose later grades were one-fourth of a grade point below their early (freshman) grades. It seems likely that the demanding sophomore Engineering program, which includes the crucial Engineering Physics and Calculus courses, accounts for this trend.

Certain other generalizations from these tables merit comment:

1. In addition to being more predictable, women also achieved at a

TABLE IV
EARLY AND LATER GRADE POINT AVERAGE FOR STUDENTS
IN VARIOUS CLASSES

Class*		Sample	
		Junior College	KSU
Freshman men (N=35)	Early GPA	1.465	1.021
	Later GPA	1.287	1.062
	Difference	.178	-.041
Sophomore men (N=106)	Early GPA	1.537	1.291
	Later GPA	1.126	1.228
	Difference	.411	.063
Junior men (N=169)	Early GPA	1.724	1.357
	Later GPA	1.307	1.492
	Difference	.417	-.135
Sophomore women (N=26)	Early GPA	2.217	1.413
	Later GPA	1.715	1.503
	Difference	.502	-.090
Junior women (N=44)	Early GPA	2.213	1.500
	Later GPA	1.697	1.656
	Difference	.516	-.150

* Figures for freshman women are not reported because of the small sample size (N=10).

higher level than did the men; this was true of both samples, and regardless of whether early or later grades were considered. This finding is also consistent with those of past studies, and probably reflects the fact that academic achievement is more of a legitimate and prized goal among girls than among boys.

2. The KSU "later" GPA did not show consistent differences between the Junior College and KSU samples. On the whole, junior college students did as well at Kansas State as did students whose original enrollment was at that institution. A detailed analysis of the

TABLE V
EARLY AND LATER GRADE POINT AVERAGES FOR
ENGINEERING STUDENTS AT KSU

Class		Sample	
		Junior College	KSU
Freshmen (N = 14)	Early GPA	1.658	1.054
	Later GPA	1.529	.839
	Difference	.129	.215
Sophomores (N = 57)	Early GPA	1.558	1.408
	Later GPA	1.139	1.170
	Difference	.419	.238
Juniors (N = 102)	Early GPA	1.777	1.377
	Later GPA	1.195	1.418
	Difference	.582	-.041

data suggested an important exception in the School of Engineering. Table V presents these data.

From Table V, it is clear that there was an increasing difference between early and later grades in the Junior College sample as the amount of junior college education increased. In addition, the differences between the two samples in terms of KSU (later) grades changed markedly from freshman through junior years. This finding suggests that, on the average, a student would be better prepared for his last two years in Engineering at Kansas State if he took his first two years at that institution rather than at a junior college. To transfer as a freshman or a sophomore would not appear to handicap the student, however.

In summary, except for Engineering juniors, the data suggest that

while grades of junior college students probably will drop when they enroll at KSU, they won't drop significantly below the average of students whose original enrollment was at Kansas State. Unfortunately, we were unable to answer an important related question: namely, did the Junior College and KSU samples differ with respect to their ability for college work?

Degree of academic uniformities among various Kansas junior colleges. The second major purpose of this study was to determine if the gross results reported earlier were uniform with respect to the various junior colleges, or if results from these schools differed among themselves. Because of the small number of women in the sample, separate

TABLE VI
ACE SCORES OBTAINED BY STUDENTS FROM VARIOUS JUNIOR COLLEGES UPON FIRST KSU ENROLLMENT

Junior College	Mean	s.d.	N
1	124.05	20.1	22
2	120.81	17.1	16
3	118.76	17.5	21
4	117.33	24.1	18
5	115.94	23.3	16
6	114.37	21.4	19
7	112.12	21.6	58
8	111.33	17.6	15
9	110.80	28.1	20
10	110.28	25.5	29
11	104.91	24.0	23
12	101.96	22.5	25

analyses of their records were not made. Similarly, results for men transfers from three junior colleges were not considered, inasmuch as there were fewer than 15 subjects from these schools.

Preliminary analyses revealed that roughly equal proportions of freshmen, sophomores, and juniors came from the 12 schools involved. This made feasible a comparison of the students in terms of scholastic ability as measured by the ACE at the time of first KSU enrollment. Results of this analysis are presented in Table VI.

An analysis of variance of the data in Table VI led to a clear rejection of the hypothesis of homogeneity. Statistically significant differences in scholastic ability were found. The average student from Junior College #1 made an ACE score at about the 85th percentile for Junior College #12.

In view of this finding, one might naturally expect higher grades at one junior college than at another. Fortunately, it was possible to statistically control the effects of ACE scores on junior college grades (essentially, make the students at each junior college equal in terms of scholastic ability), and thus gain a clearer picture of grading practices. The results of this operation are shown in Table VII.

An analysis of covariance, from which the data of Table VII were taken, resulted in a rejection of the null hypothesis. That is, when scholastic aptitude was controlled statistically, grade averages among the several junior colleges varied considerably more than would be expected by chance. Students in Junior College #2 averaged almost

TABLE VII
AVERAGE GRADES AT VARIOUS JUNIOR COLLEGES WITH
ACE SCORES HELD CONSTANT

Junior College	Mean	s.d.
1	1.259	.47
2	2.058	.60
3	1.753	.44
4	1.176	.41
5	1.742	.47
6	1.577	.69
7	1.522	.68
8	1.573	.62
9	1.754	.65
10	1.714	.65
11	1.553	.43
12	1.947	.57

one grade point higher than those in Junior College #4 when ability differences were controlled.

The implications of this finding seem clear. Valid interpretations of junior college records in terms of probable success at Kansas State seem to require a knowledge of the specific junior college involved.

In addition to the information provided by the preceding analysis (i.e., that grading standards seem to vary among the junior colleges) one might ask if performance in one junior college is more indicative of success at Kansas State than is performance in another junior college. Such a question can be answered by computing correlation coefficients between junior college grades and KSU grades for each junior college. This procedure can produce only very tentative answers in the present study, however, since a stable estimate of a corre-

lation coefficient is dependent upon large samples. Nevertheless, Table VIII has been prepared as a preliminary exploration of this question.

In view of the hazards inherent in the use of the correlation technique with such small samples, it seems safest to avoid comments on these results. There is a strong hint of differential forecasting power of junior college records, however, so that it seems reasonable to recommend further study of this question with larger samples of students.

A final question which this study investigated concerned grades at Kansas State. Did students at one junior college perform better at KSU

TABLE VIII
CORRELATIONS BETWEEN JUNIOR COLLEGE GPA AND KSU
GPA FOR TWELVE JUNIOR COLLEGE GROUPS

Junior College	N	r
1	22	.371
2	16	.700
3	21	.643
4	18	.129
5	16	.520
6	19	.479
7	58	.447
8	15	.796
9	20	.582
10	29	.686
11	23	.240
12	25	.300

than those from another? Again, since ability differences had been established, it seemed best to phrase the question, "Do students from various junior colleges achieve at different levels at KSU when they have been equated in terms of ability?" Table IX presents data on this question.

An analysis of covariance, from which the data of Table IX were derived, resulted in an acceptance of the null hypothesis. In other words, the fluctuations in KSU grades noted in Table IX were no greater than would be anticipated by chance.

These averages would probably have been even closer if it had been possible to equate the junior college groups in terms of the proportion entering each KSU school. Junior College #9, which had the highest KSU average, was grossly under-represented in the KSU Engineering

TABLE IX
AVERAGE KSU GRADES FOR VARIOUS JUNIOR COLLEGE GROUPS
WITH ACE SCORES HELD CONSTANT

Junior College	Mean	s.d.
1	1.208	.67
2	1.315	.60
3	1.197	.89
4	1.230	.49
5	1.064	.97
6	0.979	.50
7	1.193	.82
8	1.245	.81
9	1.630	.66
10	1.384	.62
11	1.255	.64
12	1.331	.63

school, whereas Junior Colleges #3 and #6 were substantially over-represented in that school.

SUMMARY AND CONCLUSIONS

This study attempted to find empirical answers to a number of questions regarding students who transferred to Kansas State University from various Kansas junior colleges. Questions regarding the meaningfulness of junior college grades and their uniformity were investigated by studying a total of 390 junior college transfer students. A comparison sample of 390 students whose original college enrollment was at KSU was drawn, such that each junior college student was matched in terms of sex, KSU school, number of college credits, and year of first college enrollment.

The following results were found:

1. Junior college grades were positively related to KSU grades, but the relationship was high only for Agriculture students and for women students.
2. Early KSU grades predicted later KSU performance substantially better than did junior college grades.
3. Junior college grades averaged substantially higher than did later grades obtained at Kansas State.
4. In the comparison sample, however, later records of KSU students tended to be slightly improved over their earlier KSU records.
5. Junior college students earned about the same grades at Kansas State as did their matched students whose original registration was at

that school. A minor, but important, exception occurred in the case of junior engineers, where junior college students achieved poorer records than did native KSU students.

6. There were wide differences among junior colleges in terms of the scholastic aptitude scores (ACE) of their KSU transfers.

7. When these ability differences were controlled, there were still large and statistically significant differences in junior college grades for students at the different schools. Junior colleges appear to have different grading standards.

8. When ability differences were controlled, students from various junior colleges made about the same grades at Kansas State. Kansas junior colleges seem to be uniform with respect to their ability to prepare students for work at Kansas State University.

9. It appears likely that more meaningful predictions of success at KSU can be made on the basis of grades in some junior colleges than in others, although larger samples are needed to establish this finding with certainty.